Development of Noncarbon Sorbents for Hg^0 Removal from Coal-Fired Power Plants

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Noncarbon materials or mineral oxides (silica gel, alumina, molecular sieves, zeolites, and montmorillonite) were modified with various functional groups, such as amine, amide, thiol, and urea; and active additives, such as elemental sulfur, sodium sulfide, and sodium polysulfide, to examine their potential as sorbents for the removal of elemental mercury (Hg^0) vapor at coal-fired utility power plants. A number of sorbent candidates, such as amine-silica gel, urea-silica gel, thiol-silica gel, amide-silica gel, sulfur-alumina, sulfur-molecular sieve, sulfur-montmorillonite, sodium sulfide-montmorillonite, and sodium polysulfide-montmorillonite, were synthesized and tested in a lab-scale, fixed-bed system under an argon flow for screening purpose at 70 ºC and/or 140 ºC. The results show that sodium polysulfide-impregnated montmorillonite may be applied as a sorbent prior to wet scrubbers where a temperature window exists between 65 ºC and 70 ºC.

US EPA announced the Clean Air Mercury Rule to permanently limit mercury emissions from coal-fired power plants on March 15, 2005. The mercury emissions control regulation requires the utility industry to identify and provide as many options as possible to efficiently and cost-effectively control mercury emissions from power plants. Sorbent injection is one of the most promising available control technologies. This poster will include our recent work to identify noncarbonaceous elemental mercury sorbents that were evaluated in a lab-scale, fixed-bed system. The original development of cost-effective, noncarbonaceous elemental mercury sorbent is described that may preserve fly ash sales for the utility industry and reduce landfill requirement.

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